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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,333	04/18/2005	Morito Akiyama	1035-548	3055
23117	7590	07/17/2006	EXAMINER	
NIXON & VANDERHYE, PC			PERT, EVAN T	
901 NORTH GLEBE ROAD, 11TH FLOOR				
ARLINGTON, VA 22203			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/516,333	AKIYAMA ET AL.	
	Examiner Evan Pert	Art Unit 2826	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 25 April 2006.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 1-16 is/are allowed.
- 6) Claim(s) 17-19 and 23 is/are rejected.
- 7) Claim(s) 20-22 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 30 November 2004 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>0105 and 0405</u> .	6) <input type="checkbox"/> Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election is acknowledged, the election being based on restriction practice by the previous examiner of record. While applicant did not traverse the restriction, the restriction is nonetheless withdrawn, making the election moot.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 17 is rejected under 35 U.S.C. 102(b) as being anticipated, for example, by EP 1 174 525 A2.

The preamble phrase “superhigh-oriented” is not considered as defining structure compared to prior art, since this language is a relative adjective [see MPEP Section 2111.02].

Regarding the body of claim 17, the '525 reference discloses a piezoelectric element (20) using a highly oriented aluminum nitride thin film (28), the piezoelectric element including a bottom electrode (26a), a piezoelectric body thin film of aluminum nitride (28), and a top electrode (26b) stacked in this order on a substrate (22/24), and the aluminum nitride having a rocking curve (RCFWHM) not exceeding 2.5° (i.e. “about 1.4° to about 1.6° per claim 3).

4. Claim 17, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 1 124 269 A2 (cited on IDS #0405).

The preamble phrase “superhigh-oriented” is not considered as defining structure compared to prior art, since this language is a relative adjective [see MPEP Section 2111.02].

Regarding the body of claim 17, the '269 reference discloses a piezoelectric element (**100**) using a highly oriented aluminum nitride thin film (**120**), the piezoelectric element including a bottom electrode (**135**), a piezoelectric body thin film of aluminum nitride (**120**), and a top electrode (**130**) stacked in this order on a substrate (**110**), and the aluminum nitride having a rocking curve (RCFWHM) not exceeding 2.5° (i.e. “preferably less than 2.5° (FWHM)” per [0013]).

Regarding claims 18 and 19, the '269 reference discloses, for example, that the bottom electrode is a single “aluminum” layer per [0015], wherein the metal called “aluminum” inherently has an electronegativity of 1.5, which is “between 1.3 and 1.5 inclusive” as recited in claim 19. (SIDE NOTE: paragraph [0015] also explains that any metal having a good conductivity can be used, of which there are many having an electronegativity of exactly 1.4, such as gold or silver).

#### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1 124 269 A2 as applied to claim 17 above, and further in view of US 5,571,603.

The '269 reference is silent about the material of the substrate (110), yet explains that "the invention does not depend on lattice matching," but rather on "surface roughness" [0017], rendering the substrate choice an open choice to one of ordinary skill in the art.

The '603 reference explains that for piezoelectric devices using aluminum nitride film as the piezoelectric film, "glass" is an "inexpensive" substrate material [col. 1, lines 26-30].

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to choose "glass" as the substrate 110 material in the '269 reference, understanding that "lattice matching" is not important for the '269 reference per [0017]:

One of ordinary skill in the art would be motivated to choose glass based on the fact that glass is suitable for the application and is "inexpensive" according to the '603 reference [col. 1, lines 26-30].

#### ***Allowable Subject Matter***

7. Claims 1-16 are allowed.
8. Claims 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 1-16 and 20-21, applicant's claimed invention can be distinguished from prior art by material choice for, and crystalline orientation of, the bottom electrode in the context of the entirely claimed invention.

While the Won et al. reference is marked as an "X" reference on the international search report for claims 3, 4 and 20 (as well as claims 17 and 18), this reference fails to disclose the claimed "bottom" and "top" electrodes; even though the "Ru" on Si example disclosed *could* arguably form a bottom electrode, there is no disclosure, for example, of both bottom and top electrodes, combined with a particular crystalline orientation of bottom electrode. The Won et al. reference does show a highly crystalline AlN film that will readily accept a pair of commonly known interdigitated electrodes, both electrodes being on the film's top surface, for example (e.g. Class 310, Subclass 313B); furthermore, the "Ru" metal has no disclosure as being a bottom electrode with particular crystalline orientation.

Regarding claim 11, the prior art does not disclose the particularly claimed combination of metal layers forming a stack body, advantageously making possible the crystal orientation of aluminum nitride film formed on the stack body.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Particularly, the website entitled "Electronegativity (Allred, Pauling, Pearson)" is cited as disclosing the electronegativity values of all the atomic elements.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ETP  
July 7, 2006

  
EVAN PERT  
PRIMARY EXAMINER